

## CLAIMS

1. A method for detecting signal information in a wireless communication network having a number of nodes for communication, said method comprising the steps of:

- each of a plurality of receiving nodes (120) converting a superposition of signals received from a plurality of transmitting nodes (10) to produce soft complex signal information;
- collecting soft complex signal information associated with said plurality of receiving nodes (120) over a transport network;
- jointly detecting signal information from at least a subset of said plurality of transmitting nodes based on the collected soft complex signal information.

2. The method according to claim 1, wherein said step of jointly detecting signal information from at least a subset of said plurality of transmitting nodes is further based on a complex channel representation related to said plurality of receiving nodes (120) and said plurality of transmitting nodes (10).

3. The method according to claim 1, wherein said complex channel representation is a complex channel gain matrix.

4. The method according to claim 1, wherein said soft complex signal information retains phase and amplitude information.

5. The method according to claim 1, wherein said soft complex signal information is collected from said plurality of receiving nodes (120) in a central node (130), and said step of jointly detecting signal information is performed by the central node (130).

6. The method according to claim 1, wherein said plurality of receiving nodes (120) are partitioned into multiple groups, and said step of collecting soft complex signal information comprises the step of collecting, for each group, soft complex signal information associated with the receiving nodes of the group, and said step of jointly detecting comprises the step of performing, for each group, joint detection of signal information based on the collected soft complex signal information associated with the group.

7. The method according to claim 6, wherein said step of performing, for each group, joint detection of signal information is further based on a complex channel representation related to the receiving nodes of the group and at least a subset of said plurality of transmitting nodes.

8. The method according to claim 6, wherein at least two of said multiple groups are partially overlapping.

9. The method according to claim 6, wherein said step of collecting, for each group, soft complex signal information associated with the receiving nodes of the group comprises the step of exchanging soft complex signal information between the receiving nodes of the group.

10. The method according to claim 9, wherein each group comprises a number of adjacent receiving nodes.

11. The method according to claim 10, wherein each of the adjacent receiving nodes within a group performs joint detection of signal information transmitted from at least a subset of said plurality of transmitting nodes based on exchanged soft complex signal information.

12. The method according to claim 6, wherein said step of performing, for each group, joint detection is performed by a signal processing node associated with the group of receiving nodes.

13. The method according to claim 12, wherein said signal processing node is a designated receiving node that belongs to the corresponding group.

14. The method according to claim 6, further comprising the steps of:

- generating, for each group, decoded signal information;
- transporting, for each group, corresponding decoded signal information to a combining point (140) for combining multiple copies of the same decoded signal information.

15. The method according to claim 6, further comprising the step of performing iterative detection of signal information based on distributed successive cancellation of currently detected signal information from soft complex signal information.

16. The method according to claim 1, further comprising the steps of:

- each receiving node attempting to detect signal information based on its own soft complex signal information and, if detection of signal information from at least a subset of said transmitting nodes is successful, determining residual soft complex signal information after cancellation of currently detected signal information;
- collecting residual soft complex signal information and currently detected signal information;
- jointly detecting signal information based on the collected residual soft complex signal information and currently detected signal information.

17. The method according to claim 1, further comprising the steps of:

- compressing soft complex signal information on the receiving node side;
- collecting the compressed soft complex signal information over a transport network; and
- decompressing the compressed soft complex information before jointly detecting signal information.

18. A system for detecting signal information in a wireless communication network having a number of nodes for communication, said system comprising:

- a plurality of receiving nodes (120), each configured for converting a superposition of signals received from a plurality of transmitting nodes (10) to produce soft complex signal information;
- means for collecting soft complex signal information associated with said plurality of receiving nodes (120) over a transport network; and
- means (134) for jointly detecting signal information from at least a subset of said plurality of transmitting nodes based on the collected soft complex signal information.

19. The system according to claim 18, wherein said means for jointly detecting is configured to operate based on the collected soft complex signal information in combination with a complex channel representation related to said plurality of receiving nodes (120) and said plurality of transmitting nodes (10).

20. The system according to claim 19, wherein said complex channel representation is a complex channel gain matrix.

21. The system according to claim 18, wherein said soft complex signal information retains phase and amplitude information.

22. The system according to claim 18, wherein said soft complex signal information is collected from said plurality of receiving nodes (120) in a central node (130), and said means for jointly detecting signal information is implemented in the central node (130).

23. The system according to claim 18, wherein said wireless communication network is a cellular network, and said plurality of receiving nodes (120) are base stations and said plurality of transmitting nodes (10) are mobile stations.

24. The system according to claim 18, wherein said plurality of receiving nodes (120) are partitioned into multiple groups, and said means for collecting soft complex signal information comprises means for collecting, for each group, soft complex signal information associated with the receiving nodes of the group, and said means for jointly detecting comprises means for performing, for each group, joint detection based on the collected soft complex signal information associated with the group.

25. The system according to claim 24, wherein said means for performing, for each group, joint detection is configured to operate based on the collected soft complex signal information associated with the group and a complex channel representation related to the receiving nodes of the group and at least a subset of said plurality of transmitting nodes.

26. The system according to claim 24, wherein at least two of said multiple groups are partially overlapping.

27. The system according to claim 24, wherein said means for collecting, for each group, soft complex signal information associated with the receiving nodes of the group comprises means for exchanging soft complex signal information between the receiving nodes of the group.

28. The system according to claim 27, wherein each group comprises a number of adjacent receiving nodes.

29. The system according to claim 28, wherein each of the adjacent receiving nodes within a group performs joint detection of signal information transmitted from at least a subset of said plurality of transmitting nodes based on exchanged soft complex signal information.

30. The system according to claim 24, wherein said means for performing, for each group, joint detection is implemented in a signal processing node associated with the group of receiving nodes.

31. The system according to claim 30, wherein said signal processing node is a designated receiving node that belongs to the corresponding group.

32. The system according to claim 24, further comprising:

- means for generating, for each group, decoded signal information; and
- means for transporting, for each group, corresponding decoded signal information to a combining unit (140) for combining multiple copies of the same decoded signal information.

33. The system according to claim 24, further comprising means for performing iterative detection of signal information based on distributed successive cancellation of currently detected signal information from soft complex signal information.

34. The system according to claim 18, further comprising:

- means, in each receiving node, for attempting to detect signal information based on its own soft complex signal information and for determining, if detection of signal information from at least a subset of said transmitting nodes is

successful, residual soft complex signal information after cancellation of currently detected signal information;

- means for collecting residual soft complex signal information and currently detected signal information; and
- means for jointly detecting signal information based on the collected residual soft complex signal information and currently detected signal information.

35. The system according to claim 18, further comprising:

- means (127) for compressing soft complex signal information on the receiving node side;
- means for collecting the compressed soft complex signal information over a transport network; and
- means (133) for decompressing the compressed soft complex information for input of decompressed soft complex information to said means (134) for jointly detecting signal information.

36. A network node (120; 130) in a wireless communication network, said network node comprising:

- means for collecting, from each one of a plurality of receiving nodes (120), corresponding soft complex signal information produced from a superposition of signals received from a plurality of transmitting nodes (10); and
- means (134) for jointly detecting signal information from said plurality of transmitting nodes (10) based on the collected soft complex signal information and a complex channel representation related to said plurality of receiving nodes (120) and said plurality of transmitting nodes (10).

37. A network node (120) in a wireless communication network, said network node comprising:

- means for converting a superposition of signals received from a plurality of transmitting nodes (10) to produce soft complex signal information;

- means for collecting complementary soft complex signal information from at least one associated node (120), each associated node producing complementary soft complex signal information from a superposition of signals received from said plurality of transmitting nodes (10); and

- means for jointly detecting signal information based on the acquired soft complex signal information and a complex channel representation related to the network node, each associated node and said plurality of transmitting nodes (10).

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